

"Environmental catastrophes in the Earth's history
due to Solar system's encounters with Giant Molecular
Clouds"

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In its motion through the Milky Way galaxy, the solar system encounters an average - density (≥ 330 H atoms cm^{-3}) giant molecular cloud (GMC) approximately every 108 years, a dense ($\sim 2 \times 10^3$ H atoms cm^{-3}) GMC every ~ 109 years and will inevitably encounter them in the future [Talbot and Newman, 1977]. However, there have been no studies linking such events with severe (snowball) glaciations in Earth history. Here we show that dramatic climate change can be caused by interstellar dust accumulating in Earth's atmosphere during the solar system's immersion into a dense ($\sim 2 \times 10^3$ H atoms cm^{-3}) GMC. The stratospheric dust layer from such interstellar particles could provide enough radiative forcing to trigger the runaway ice-albedo feedback that results in global snowball glaciations. We also demonstrate that more frequent collisions with less dense GMCs could cause moderate ice ages.